



Ministry of
Agriculture

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Animal Health Centre

AAVLD - Accredited Laboratory

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Final Report AHC Case: 16-6517

Last Updated: 05/23/17 1:02 PM

Pathologist: Stephen Raverty, DVM

Received Date: 12/22/16

Collected Date: 12/22/16

Client Ref No:

Submitter: John Ford - DFO

Phone:

Owner: Pacific Bio Station J. Fo

Phone:

Premise ID:

Veterinarian: Dr. Marty Haulena

Clinic: Vancouver Aquarium

Phone: (604) 659-3468

Fax: (604) 659-3469

Animal Data

Species: Killer Whale

Breed:

Sex: M

Age: 18 Years

Animal ID:

Case History

Submitted one Killer Whale for post mortem.

Possible ship strike, animal towed to Sechelt for necropsy. One dead on Approx Dec 18, 2016

RR16-0638

***All histories are copied verbatim from the submission form**

Final Diagnosis

MORPHOLOGIC DIAGNOSES:

- 1). Thorax, left dorsolateral: Hemorrhage, subcutaneous, muscular, fascial and paravertebral, severe, segmental, acute with variable amounts of edema fluid (Gross diagnosis)
- 2). Skull: Hemorrhage, subcutaneous, marked, bilateral to circumferential, tracking (Gross diagnosis)
- 3). Occipital region, rostral-lateral blowhole, and acoustic fat: Hemorrhage, marked, multifocally extensive, acute (Gross diagnosis)
- 4). Skeletal muscle: Degeneration, discoid, moderate, multifocal to coalescing, with variable endomysial, epimysial and fascial edema
- 5). Skin: Dermatitis, superficial, perivascular and interstitial, mild to moderate, multifocal, subacute
- 6). Blowhole: Edema, submucosal, moderate, multifocal to coalescing, acute
- 7). Blowhole: Hyperplasia, lymphocytic, perivascular superficial submucosa, moderate, segmental
- 8). Adipose tissue, blubber: Edema, moderate to marked, multifocal, random, acute with occasional entrapment of adipocytes and disruption of collagen fibers
- 9). Lung: Pneumonia, mild, multifocal, random, nonsuppurative

There are no significant lesions within the peripheral nerves, peripheral vasculature, heart, larynx, urinary bladder, stomach, small intestine, colon, or liver.

COMMENTS:

Post mortem change significantly hampered microscopic assessment of the sectioned tissues and precluded evaluation

of multiple levels of the gastrointestinal tract. Although the animal was a code 2.5-3 at the time of necropsy, histopathology revealed considerably more advanced autolysis than appreciated with bacterial overgrowth. Sections of the blubber and skeletal muscle disclosed variable amounts of hypo to acellular proteinaceous fluid which effaces and entraps multiple fat cells, collagen bundles, myofibers and fascial planes and no apparent hemorrhage. The proteinaceous lakes within the blubber and skeletal muscle would have occurred antemortem and likely consist of edema fluid with variable amounts of hemolysed red blood cells. In select sections of skeletal muscle, there was multifocal to coalescing discoid myofiber degeneration consistent with prior reports of trauma associated lesions with ship strikes in stranded cetaceans; these changes are consistent with the animal having been alive at the time of presumptive impact and may not necessarily indicate the severity and pathologic consequences of injury. Due to the extent of hemorrhage in the neck and cranial thoracic region, the head was disarticulated, cleaned and a CT scan performed at the FP Innovation, University of British Columbia. Images were initially reviewed independently by Dr T McKleveen of VCA Veterinary Speciality Centre of Seattle, WA and Dr S Dennison, Consultant Veterinary Radiology, Oakton, VA and a summary report was compiled. There were bone fragments noted in the rostral dorsal aspect of the skull. However, no fractures were apparent and the bone fragments were attributed to normal anatomic variation for this animal related to incomplete ossification. The last maxillary and mandibular teeth are lost and there are small mineralized deposits associated with the ear bones which most likely represent otoliths, mineralized granulomas and dystrophic calcification associated with ectopic parasite migration or long past inflammation. Age related articular degeneration was noted in both temporomandibular joints which may have impeded the ability of this animal to prehend or chew food. Sections of the blowhole mucosa revealed submucosal edema fluid which may substantiate the CT scan results of fluid accumulation within the nasal sacs and upper airway regions. Based on the changes within the blubber and skeletal muscle from the grossly noted presumed impact areas of the neck and cranial thorax, the fluid accumulation may be attributed to antemortem trauma. There was no apparent indication of inflammatory infiltrate or vasculopathy within this examined area. Sections of the kidney were too autolyzed to assess for myoglobinuria and in the skin, the inflammation within the apical portions of multiple fibrovascular rete may be attributed to localized trauma and necrosis or recruitment of infiltrate, antigenemia or some other process. The gross and histopathologic findings are consistent with trauma to the dorsolateral aspect of the cranial thorax, neck and head; the fluid accumulation noted within the air sacs and blowhole were noted microscopically and consistent with changes observed in the traumatic region along the torso. Harmful algal bloom analysis disclosed 0.6 ng/g of domoic acid in the urine with no appreciable levels identified in the stomach or intestinal contents or vitreous humour. Domoic acid exposure can result in significant neurologic signs and neuropathology in California sea lions and despite detection in a number of tissue samples (matrices) in cetaceans, there is still insufficient data to infer associated morbidity. It is unlikely that this level may have impeded the ability of this animal to avoid impact with a vessel. Routine microbiology yielded heavy and moderate mixed growth of *Edwardsiella tarda* and *Escherichia coli*, respectively from the colon with light moderate mixed growth of *E tarda* and *Streptococcus* spp from the lung, liver and lymph node. There was heavy growth of *Streptococcus* spp from the brain with no *Salmonella* spp isolated from the colon. Based on the degree of post mortem change, these isolates are most likely due to post mortem tissue invasion and proliferation rather than primary pathogens. Polymerase chain reaction of pooled tissue for *Brucella* and morbillivirus proved negative and electron microscopy of the colon did not identify any virus like particles.

Necropsy

A 673 cm total length male killer whale (J34) with minimal reproductive activity is presented dead, Dec 21, 2016 and in moderate body and post mortem condition. There are moderate subcutaneous and pleural fat stores and the animal is well muscled. The axillary girth is 374 cm and the maximum girth is mid-thoracic and 425 cm. The blubber thickness at dorsal, midlateral and midventral levels at the cranial limit of the dorsal fin is 6.75 cm, 7 cm and 6.5 cm. The cut surface glistens and a small amount of oil oozes. Extending from thoracic vertebrae 8-10 cranially to the nape, along the left and to a much lesser extent, right dorsolateral aspect of the torso there is massive subcutaneous and fascial hemorrhage which extends multifocally deep into the subjacent epaxial skeletal musculature, is admixed with variable amounts of edema fluid and tracks along fascial planes deep to the periosteum of thoracic and cervical vertebrae. The hemorrhage and edema fluid dissects dependently and bilaterally along the fascial planes of the left and right sides of the skull to the throat and there is multifocally extensive hemorrhage along the periosteum of the left occipital bone, in the subcutaneous tissue rostral to blowhole and throughout the rostral third of the left acoustic fat. The lungs are moist and dark red with a small amount of serosanguinous fluid within bronchi. There is diffuse detachment of the gastric mucosa and the lumen contains a small amount of dark red fluid (possible ingested blood). The small intestine contains a small amount of grey orange chyme and there is a sparse amount of dull grey mucoid feces in the rectum. The bladder contains approximately 3 ml of turbid red yellow urine. There are no other apparent gross internal or external lesions.

Biological Data

Total length 673 cm

Snout flipper 167 cm

Flipper

Cranial insertion 138 cm

Case: 166517

Width 86 cm
 Fluke width 200 cm
 Snout to anus 234 cm
 Bubber thickness
 Dorsal 6.75 cm
 Lateral 7 cm
 Midventral 6.5 cm

COMMENTS:

The gross lesions are consistent with blunt force trauma and based on the anatomic site of impact, the sustained injuries would have contributed significantly to the demise of this animal. The tracking hemorrhage throughout the subcutis of the head suggests that the animal would have survived the initial trauma for a period time, prior to death. Although the brain was too autolyzed to assess for hemorrhage (coup contra-coup), a few bone spicules and sheaves up to 3-4 cm long were interspersed within the brain tissue. The skull has been flensed and arrangements are being made for CT imaging scans. Based on qualitative assessment, the animal was considered in moderate to good body condition and there were no apparent lesions or abnormalities which may have predisposed this animal to injury. Representative tissues have been harvested and will be analysed in house and forwarded to outside reference laboratories for additional testing. Further evaluation is pending histopathology and ancillary diagnostics.

GROSS DIAGNOSES:

- 1). Thorax, left dorsolateral: Hemorrhage, subcutaneous, muscular, fascial and paravertebral, severe, segmental, acute with variable amounts of edema fluid
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Histopathology

Please refer to Morphologic Diagnoses.

Bacteriology

Aerobic Culture - Prod Resulted by: Erin Zabek Verified by: Roberta Yemen on 12/28/16 @ 1:47 PM

| Specimen | ID | Isolate | Result | Level |
|------------|----|---------------------------------|----------|-------|
| Colon | | Edwardsiella tarda | Positive | 4+ |
| Colon | | E.coli (non-haemolytic) | Positive | 2+ |
| Lung | | Edwardsiella tarda | Positive | 2+ |
| Lung | | Streptococcus sp (non-haemolyt) | Positive | 3+ |
| Lymph Node | | Streptococcus sp (non-haemolyt) | Positive | 1+ |
| Liver | | Edwardsiella tarda | Positive | 1+ |
| Liver | | Streptococcus sp (non-haemolyt) | Positive | 1+ |
| Brain | | Streptococcus sp (non-haemolyt) | Positive | 4+ |

Culture - Salmonella Resulted by: Erin Zabek Verified by: Roberta Yemen on 12/28/16 @ 1:47 PM

| Specimen | ID | Isolate | Result | Level |
|----------|----|---------|----------------------------|-------|
| Colon | | | No Salmonella sp. Isolated | |

GNEG Resulted by: Erin Zabek Verified by: Roberta Yemen on 12/28/16 @ 1:48 PM

| | Organism |
|--------------------------------|-------------------------|
| Antibiotics | E.coli (non-haemolytic) |
| Enrofloxacin | s |
| Ceftiofur | s |
| Gentamicin | s |
| Neomycin | s |
| Ampicillin-Sulbactam | s |
| Sulphamethoxazole/Trimethoprim | s |
| Tetracycline | s |
| Florfenicol | s |

Molecular Diagnostics

Brucella spp. Resulted by: A Scouras Verified by: Tomy Joseph on 12/28/16 @ 3:04 PM

| Specimen | ID | Test | Result |
|----------|--------------------------------|---------------|----------|
| Tissue | bladder, Ig, Iv, kd, LN, br | Brucella spp. | Negative |

Test validation in progress.

Morbillivirus-Consensus Resulted by: A Scouras Verified by: Tomy Joseph on 12/28/16 @ 3:05 PM

| Specimen | ID | Test | Result |
|----------|--------------------------------|-------------------------|----------|
| Brain | | Morbillivirus-Consensus | Negative |
| Tissue | bladder, Ig, Iv, kd, LN, br | Morbillivirus-Consensus | Negative |

Test validation in progress.

Virology

Electron Microscopy Resulted by: Melissa Trapp Verified by: Tomy Joseph on 01/11/17 @ 10:10 AM

| Specimen | ID | Isolate | Result | Level |
|----------|----|---------|----------|-------|
| Colon | | | Negative | |



Stephen Raverty, DVM
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These results relate only to the animals or items tested.

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END OF REPORT